

Pay-As-You-Drive Insurance in BC

Backgrounder

2 February 2018

Pay-As-You-Drive Insurance is the best transportation policy reform you've probably never heard of.

What is PAYD Vehicle Insurance?

Pay-as-you-drive (PAYD, also known as *distance-based usage-based*, *usage-based* and *per-mile*) vehicle insurance which means that premiums are based directly on the amount a vehicle is driven during the policy term: *the more you drive the more you pay and the less you drive the more you save* (Greenberg 2013). This changes the unit of exposure (how premiums are calculated) from the *vehicle-year* to the *vehicle-kilometer*. Existing rating factors are incorporated so higher-risk motorists pay more per kilometer than lower-risk drivers. For example, a \$400 annual premium becomes 2¢ per kilometer, and a \$1,600 annual premium becomes 8¢ per kilometer. An average motorist would pay about 6.4¢ per kilometer.

PAYD pricing gives motorists a significant new incentive to reduce mileage, approximately equal to a 50% fuel price increase, but is not a new expense, simply a different way of paying an existing fee. Motorists who drive average annual mileage pay the same as they do now, but those who drive less save money, reflecting the claim cost savings provided by reductions in mileage and therefore crash risk. Based on experience with similar vehicle price changes, PAYD pricing is predicted to reduce affected vehicles' annual mileage by 10-15%, consisting of lower-value vehicle travel that they value less than the per-kilometer savings.

PAYD insurance has been widely studied by economists as a way to increase efficiency, fairness and affordability (Bordoff and Noel 2008; Edlin 2003; Greenberg 2013). It redefines insurance affordability; with current pricing *affordability* means that even higher-risk, lower-income motorists can afford basic liability coverage, which requires cross-subsidies from lower- to higher-risk motorists, with PAYD, *affordability* means that motorists limit their mileage to what they can afford, as with most other goods.

Potential Benefits

- **Consumer savings, affordability and fairness.** A typical motorist who reduces vehicle mileage 10-15% will save \$100-150 annually, representing the claim cost savings from reduced exposure. Since lower-income motorists tend to drive their vehicles less than average, they tend to save most. It increases fairness: current insurance pricing overcharges motorists who drive less than average and undercharge those who drive more than average in each rate category. It will also allow some households to keep a seldom-used vehicle, such as an old truck for errands or a recreational vehicle.
- **Reduced pollution emissions.** The predicted 10-15% travel reduction should provide comparable reductions in energy consumption and pollution emissions (Cambridge Systematics [2009] ranked PAYD as one of the most cost effective climate change emission reduction strategy available).
- **Traffic safety.** Vehicle crashes should decline more than mileage (a 10% mileage reduction should reduce crashes 12-15%) because higher-risk motorists, who pay higher premiums, have the greatest incentive to reduce their driving (Ferreira and Minikel 2012; Kendall 2016).
- **Reduced Traffic congestion and roadway costs.** Everybody can benefit from PAYD pricing that reduces vehicle traffic and associated costs.

Travel and Safety Impacts

Several types of evidence indicate that PAYD pricing can reduce lower-value vehicle travel and traffic crashes. The first consists of general research on the relationships between per capita vehicle travel and per capita traffic casualty rates, as illustrated in Figure 1, and disaggregated data for individual vehicles, as illustrated in Figure 2.

Figure 1 Vehicle Mileage Versus Traffic Fatalities In U.S. States (FHWA 1993-2002 data)

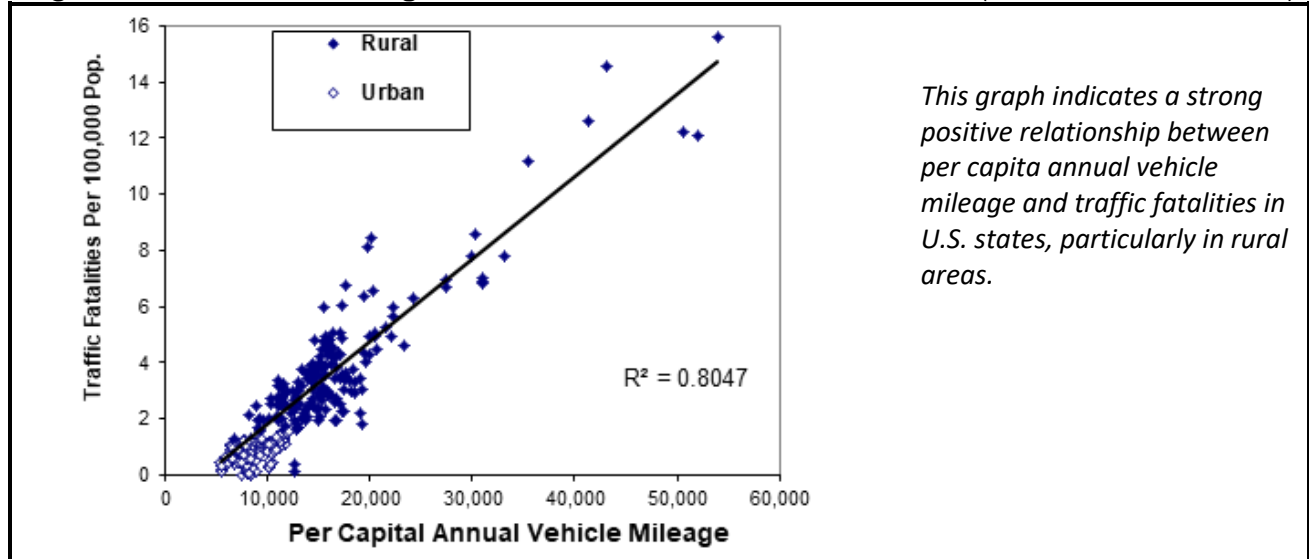
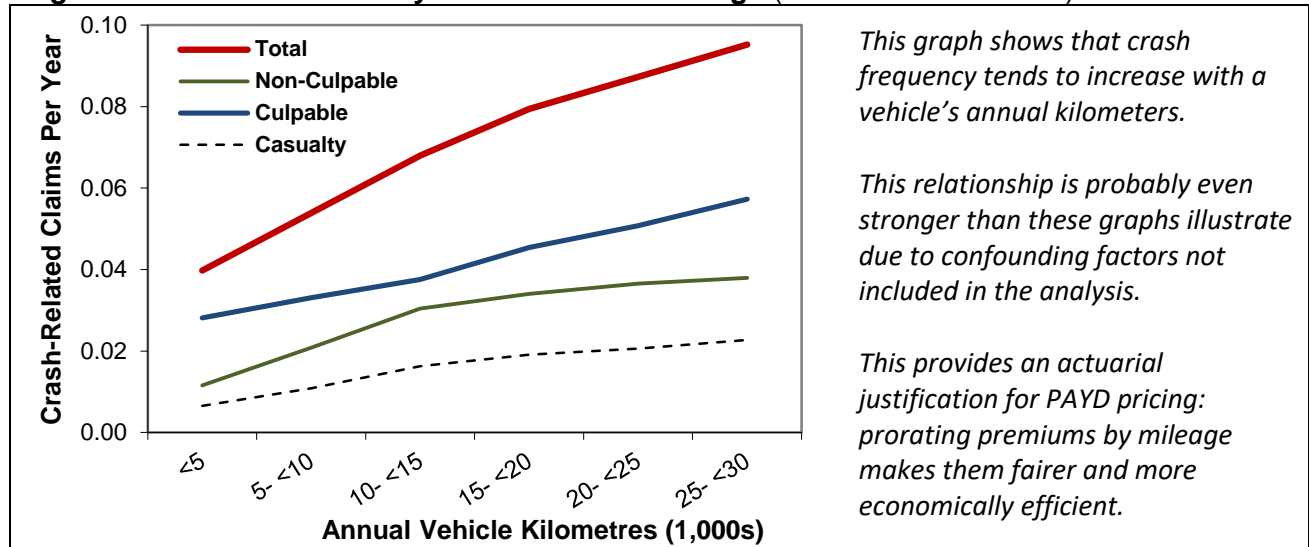


Figure 2 Crash Rates by Annual Vehicle Mileage (British Columbia Data)



A major study that matched insurance claim cost and annual mileage data collected during emission inspections for 2.8 million vehicle-years found a significant correlation between a vehicle's annual mileage and its chance of having a crash and insurance claim (Ferreira and Minike 2012). Since mileage is just one of several important risk factors, it would not be actuarially accurate to charge all motorists the same per-kilometer premium, as with pay-at-the-pump insurance, but premiums more accurately reflect a vehicle's claim costs if annual vehicle travel is incorporated with other rating factors.

About two-thirds of casualty crashes involve multiple vehicles, so reductions in total vehicle travel in an area can provide proportionately larger crash reductions, since these reductions reduce both internal risk to the vehicle that reduces its mileage, and the risk it imposes on other road users (Edlin and Mandic 2006). In other words, each road user is safer if other motorists reduce their vehicle travel since this reduces their exposure to other drivers' errors. Edlin (1998) found the elasticity of claim costs with respect to mileage is between 1.42 and 1.85, meaning a 10% reduction in vehicle mileage reduces total crashes 14-18%.

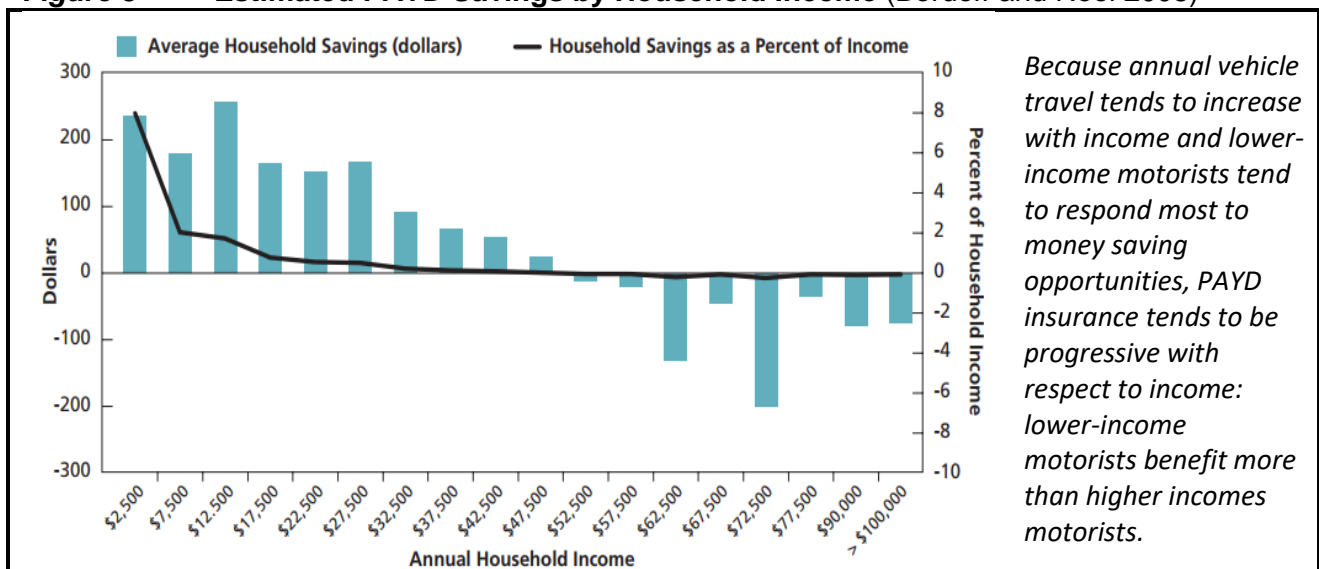
Good research indicates that prices affect vehicle travel and crash rates. Using international data, Ahangari, et al. (2014), and Burke and Nishitatenno (2015), found that a 10% gasoline price increase reduces traffic fatalities 2-6%. Using U.S. data, Sivak (2008) and Grabowski and Morrisey (2004) estimate that each 10% fuel price increase reduces total traffic deaths 2.3% or more, with larger reductions by younger drivers, apparently because they are particularly price-sensitive. In subsequent research, Grabowski and Morrisey (2006) estimate that each one-cent state gasoline taxes increase reduces per capita traffic fatalities 0.25%. Leigh and Geraghty (2008) estimate that a sustained 20% gasoline price increase would reduce approximately 2,000 U.S. traffic crash deaths (about 5% of the total), plus about 600 air pollution deaths.

Studies by Chi, et al. (2010, 2011 and 2013) quantify fuel price impacts on traffic crashes in various U.S. regions. Fuel price increases reduce both total traffic crashes and distance-based crash rates, with impacts that vary by geographic and demographic factors, and increase over time. All these studies show that fuel price increases reduce per-mile crash rate, so a 1% reduction in total VMT provides more than a 1% reduction in total crashes. In Minnesota they estimate that a \$1.00 per gallon gasoline price increase would reduce total rural crashes 28.2%, total urban crashes 18.4%, and urban fatal crashes 18.4%. They find that fuel price increases cause larger short-term crash reductions by younger drivers, and larger intermediate-term reductions by older and male drivers (2010a; 2011), and large drunk driving crash reductions (2010b).

Impacts on Lower-Income Motorists

Since lower-income motorists tend to drive their vehicles fewer than average annual kilometers, and tend to respond to money saving opportunities, PAYD tends to be progressive with respect to income. According to a major Brookings Institution study, 64% of all households, and almost 80% of low-income households, would save money with PAYD insurance, averaging \$496 annually per household that saves.

Figure 3 Estimated PAYD Savings by Household Income (Bordoff and Noel 2008)



How Does PAYD Affect Consumers?

Most motorists have some marginal-value vehicle travel that they will make if driving seems cheap, but not if they can save money. PAYD insurance gives motorists a significant new incentive to reduce their lower-value mileage, but it is not a new fee, just a different way to pay an existing fee. The vehicle travel foregone consists of vehicle-kilometers that motorists value less than the savings. For example, if a motorist who currently pays \$1,400 annual premiums instead pays 7¢ per kilometer, and as a result drives 2,000 fewer annual kilometers, the reduced vehicle travel consists of kilometers they value less than 7¢, and their \$140 savings represent consumer surplus gain, money they value more than the vehicle-kilometers foregone.

Implementing PAYD in BC

A growing body of research indicates that PAYD vehicle insurance pricing can help achieve provincial policy goals including consumer savings and affordability (savings for lower-income households), road safety, reduced congestion and pollution emissions reductions. PAYD insurance is offered by private companies in several countries, including the U.S., Europe and Australia, but is not in Canada, including BC (Ask Joanne 2012; Wikipedia 2017).

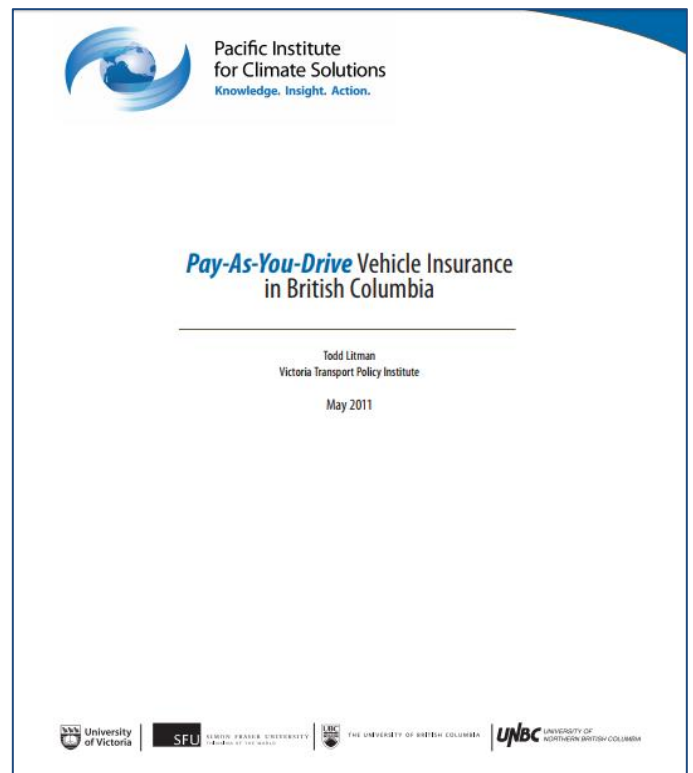
In 1996 ICBC commissioned a technical study that examined its feasibility and impacts (Litman 1997). The results were promising; they demonstrated the actuarial justification for PAYD, identified various benefits and described how it could be implemented. However, ICBC opposed the concept on the grounds that it is unproven and could reduce the corporation's profitability, so no action was taken.

Transportation is the largest single source of greenhouse gas emissions (BC 2016). In 2010 the BC Ministry of Environment and in 2014 the BC Climate Action Secretariat sponsored analysis of potential transportation emission reduction strategies, including PAYD.

In 2011 the Pacific Institute for Climate Solutions (PICS) published, *Pay-As-You-Drive Vehicle Insurance in British Columbia* (Litman 2011), which provided further support for PAYD as a climate change emission reduction strategy, but no further action was taken due to ICBC opposition. The recent ICBC review identified usage-based pricing using electronic vehicle tracking, as a possible safety and cost saving strategy, although basic PAYD is probably more cost effective and politically acceptable (Ernst & Young 2017).

PAYD insurance was recently recognized as a potential provincial traffic safety strategy (Kendall 2016).

PAYD is particularly appropriate in British Columbia because ICBC has a social mandate, and so should favor policies that maximize affordability, safety, and environmental protection. This is a particularly good time to consider PAYD in BC because crashes and insurance premiums are increasing and the province is looking for innovative traffic safety and emission reduction strategies.



Frequently Asked Questions

How is it applied?

Basic PAYD (the system we recommend) changes the unit of exposure from the *vehicle-year* to the *vehicle-kilometer*, so for example, rather than paying \$1,000 annually a motorist pays 5¢ per kilometer, based on odometer readings verified by brokers or a digital photo. At the beginning of the policy term motorists pay for a year's worth of insurance, as they do now, and settle when the policy is renewed; if they drove less than their prepaid kilometers they receive a rebate, if they drove more they owe for the unpaid kilometers, at a slightly higher rate (say, 5.3¢ per additional kilometer) to account for ICBC's foregone interest. It could be a consumer option or implemented on all personal vehicles.

How are per-kilometer premiums calculated?

Premiums are calculated by dividing current annual premiums by average annual kilometers for each rate class. ICBC premiums currently average \$1,280 per vehicle-year and personal vehicles average about 20,000 annual kilometers, so PAYD premiums would average about 6.4¢ per kilometer. All existing rating factors are included, so a motorist who currently pays \$1,600 annually would pay twice per kilometer as one that pays \$800 annually.

How does it affect vehicle travel?

The 6.4¢ per kilometer average PAYD premium is equivalent to a 64¢ per liter fuel price increase, although it is not a new fee, just a different way of paying an existing fee. Based on experience with other transportation price changes, experts predict that PAYD pricing would reduce affected vehicle-travel 10-15%, with greater reductions by higher risk motorists who currently pay higher annual premiums.

Aren't other risk factors more important than mileage?

Annual mileage is one of several significant risk factors. It would not be actuarially accurate to use mileage *instead of* other rating factors, by charging all motorists the same per-kilometer premium, but premiums become far more accurate if mileage is incorporated with other rating factors through PAYD pricing.

Who benefits, who loses?

PAYD insurance can provide direct and indirect benefits:

- Motorists who currently drive less than their rate class average save money.
- Motorists who drive about their rate class average and reduce their mileage would also save money.
- Motorists who drive significantly more than average for their rate class average would pay higher premiums, but benefit most from reduced congestion and accident risk.

How does PAYD affect suburban, rural and lower-income motorists?

Because insurance rates reflect territory (where motorists reside), PAYD pricing does not increase average premiums for any geographic group: only motorists who drive more than average for their territory would pay more, and if motorists reduce their vehicle travel as predicted, most suburban and rural motorists would save money and enjoy other benefits. Since annual vehicle travel tends to increase with income, and lower-income motorists tend to be price sensitive (they are more responsive to money saving opportunities) PAYD tends to be very progressive with respect to income.

How does PAYD affect traffic safety?

Extensive research indicates that PAYD pricing could provide large safety benefits. Since higher risk motorists would pay larger premiums, they should reduce their mileage more than average, and since most casualty crashes involve multiple vehicles, the reduction in crashes and claim costs should be proportionately larger than the reduction in mileage, and increase safety for all road users.

Information Resources

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